

2005 Monitoring Summary



Mulberry Creek at Dallas County road 52 (32.58278/-86.90361)

BACKGROUND

Mulberry Creek at MUL-D-1 is one of a [network of 94 ambient sites](#) monitored annually to identify long-term trends in water quality and to provide data for the development of TMDLS and water quality criteria. The site is also a USGS stream flow gauging station ([02422500](#)).

Habitat and macroinvertebrate assessments were conducted on June 28, 2005 to assess the biological integrity at this site.

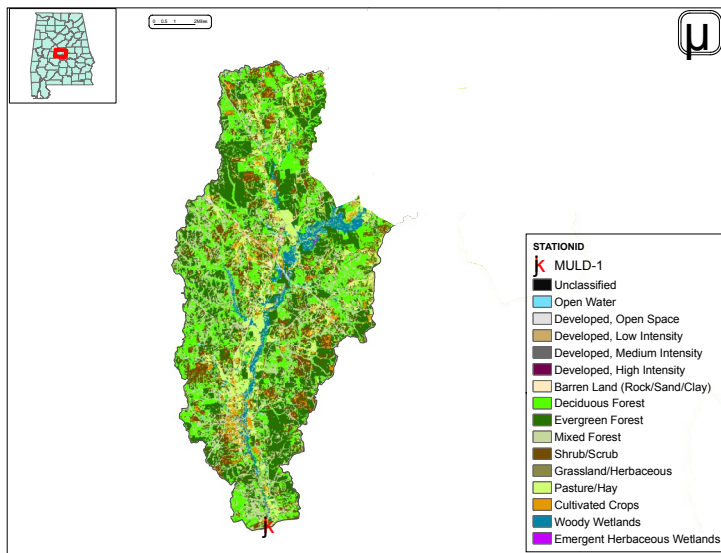


Figure 1. Sampling location and landuse within the Mulberry Creek watershed upstream of MUL-D-1.

WATERSHED CHARACTERISTICS

The Mulberry Creek watershed lies within the Fall Line Hills (65i) ecoregion. It is largely comprised of forest (63%). Fourteen percent of the watershed is pasture lands and cultivated crops. Six small towns are located within the watershed (Vine Hill, Riderville, Stanton, Maplesville, Randolph, Jones) and account for the permitted discharges (Table 1).

REACH CHARACTERISTICS

[General observations](#) (Table 2) and [habitat assessments](#) (Table 3) were completed during the macroinvertebrate assessment. In comparison with reference reaches in the same ecoregion, they give an indication of the physical condition of the site and the quality and availability of habitat. Mulberry Creek at MUL-D-1 is a [Swimming/Fish & Wildlife \(S/F&W\)](#) stream. It is a wide, low-gradient stream characterized by sand and gravel substrates. Overall habitat quality was categorized as *sub-optimal* due to a lack of in-stream habitat. The reach was also characterized by a relatively straight stream channel, which puts it at risk to impacts from sedimentation and scouring.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's [Intensive Multi-habitat Bioassessment methodology \(WMB-I\)](#). The WMB-I uses measures of taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each metric is scored on a 100 point scale. The final score is an average of the score for each metric. The relatively low taxa richness of stoneflies, a pollution-intolerant group, and high percent dominance of pollution-tolerant organisms indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Drainage Area (mi ²)	204
Ecoregion ^a	65i
% Landuse	
Open water	<1
Wetland	Woody 3
	Emergent herbaceous <1
Forest	Deciduous 26
	Evergreen 22
	Mixed 15
Shrub/scrub	15
Grassland/herbaceous	<1
Pasture/hay	11
Cultivated crops	3
Development	Open space 3
	Low intensity 1
	Moderate intensity <1
	High intensity <1
Barren	<1
Population/km ² ^b	13
# NPDES Permits ^c	TOTAL 26
	Construction Stormwater 15
	Mining 3
	Industrial General 2
	Industrial Individual 1
	Municipal Individual 5

a. Fall Line Hills

b. 2000 U. S. Census data

c. #NPDES permits from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics at MUL-D-1, June 28, 2005.

Physical Characterization	
Width (ft)	60
Canopy cover	Open
Depth (ft)	
	Run 1.0
	Pool 2.5
% of Reach	
	Run 90
	Pool 10
% Substrate	
	Cobble 2
	Gravel 34
	Sand 54
	Silt 3
	Clay 5
	Organic Matter 2

Table 3. Results of the habitat assessment conducted at MUL-D-1, June 28, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	41	Marginal (40-52)
Sediment deposition	64	Sub-optimal (53-65)
Sinuosity	35	Poor (<45)
Bank and vegetative stability	64	Sub-optimal (60-74)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	132	
% Maximum score	60	Sub-optimal (53-65)

Table 4. Results of macroinvertebrate bioassessment.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	15	60	Good (56-78)
Taxonomic composition measures			
% Non-insect taxa	6	95	Good (92.7-96.3)
% Plecoptera	2	9	Good (5.6-52.8)
% Dominant taxa	8	100	Excellent (>85.2)
Functional composition measures			
% Predators	9	6	Very Poor (<15.1)
Tolerance measures			
Beck's community tolerance index	4	18	Poor (10.6-21.2)
% Nutrient tolerant organisms	24	77	Good (76.2-88.1)
WMB-I Assessment Score	---	52	Fair (37-56)

WATER CHEMISTRY RESULTS

Median values of [in situ measurements](#) and [water chemistry of samples](#) collected in June, August and October of 2005 to help identify any stressors to the biological communities are presented in Table 5. *In situ* parameters were measured during each site visit. One of four (25%) turbidity measurements (August 11, 2005) were above *S/F&W* water use criteria. Median total suspended solids was above values expected for Fall Line Hills streams. The site did not exceed [numeric criteria for metals](#). However, total aluminum and iron concentrations were also higher than expected in this ecoregion. The median concentration of carbonaceous 5-day biochemical oxygen demand (CBOD₅), which is a measure of the amount of oxygen required by microorganisms to decompose organic matter in the water, was also elevated. The fecal coliform count was >200 colonies/100mL during two of three sampling events. However, stream flows during the collection of these samples were above normal and may account for the elevated turbidity, carbonaceous 5-day biochemical oxygen demand, total suspended solids, and fecal coliform results.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Mulberry Creek is characterized by stream flows that rise and fall very quickly ([02422500](#)). Combined with the low sinuosity, this could increase scouring impacts to biological communities. High stream flows also likely account for the elevated turbidity, CBOD₅, total suspended solids, and fecal coliform counts during 2005.

Table 5. Summary of water quality data collected March-October, 2005. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	4	18.0	28.0	24.0	23.5	4.4
Turbidity (NTU)	4	6.2	274.0 ^C	72.9	106.5	127.3
Total dissolved solids (mg/L)	3	20.0	120.0	69.0	69.7	50.0
Total suspended solids (mg/L)	3	10.0	276.0	125.0 ^M	137.0	133.4
Specific conductance (µmhos)	4	30.6	43.5	36.7	36.9	6.0
Hardness (mg/L)	2	8.9	12.9	10.9	10.9	2.8
Alkalinity (mg/L)	3	2.9	9.0	4.5	5.5	3.2
Stream Flow (cfs)	4	105.0	1040	447.5	510.0	---
Chemical						
Dissolved oxygen (mg/L)	4	7.5	9.4	7.9	8.2	0.9
pH (su)	4	6.2	7.4	7.0	6.9	0.6
Ammonia nitrogen (mg/L)	3	<0.015	0.015	0.015	0.013	0.004
Nitrate+nitrite nitrogen (mg/L)	3	0.108	0.170	0.110	0.129	0.035
Total Kjeldahl nitrogen (mg/L)	3	0.150	0.309	0.272	0.219	0.126
Total nitrogen (mg/L)	3	0.130	0.394	0.326	0.283	0.137
Dissolved reactive phosphorus (mg/L)	3	0.012	0.016	0.012	0.013	0.002
Total phosphorus (mg/L)	3	0.006	0.078	0.053	0.046	0.037
CBOD-5 (mg/L)	3	1.2	2.4	2.0 ^M	1.9	0.6
Chlorides (mg/L)	3	4.0	5.4	4.7	4.7	0.7
Total Metals						
Aluminum (mg/L)	1				2.060 ^M	
Iron (mg/L)	1				4.750 ^M	
Manganese (mg/L)	1				0.206	
Dissolved Metals						
Aluminum (mg/L)	1				<0.015	
Antimony (µg/L)	1				<2	
Arsenic (µg/L)	1				<10	
Cadmium (mg/L)	1				<0.005	
Chromium (mg/L)	1				<0.004	
Copper (mg/L)	1				<0.005	
Iron (mg/L)	1				0.157	
Lead (µg/L)	1				<2	
Manganese (mg/L)	1				<0.02	
Mercury (µg/L)	1				<0.3	
Nickel (mg/L)	1				<0.006	
Selenium (µg/L)	1				<10	
Silver (mg/L)	1				<0.003	
Thallium (µg/L)	1				<1	
Zinc (mg/L)	1				<0.006	
Biological						
^J Chlorophyll a (mg/L)	3	1.07	10.68	2.67	4.81	5.15
^J Fecal Coliform (col/100 mL)	3	30	6800 ^C	770	2533	3714

J=estimate; N=# samples; C=value exceeds established criteria for Swimming/ Fish & Wildlife use classification; M=value > 90% of ADEM's verified reference reaches collected in ecoregion 65i.

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